UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/713,430	11/17/2003	Haitao Wu	60282 00114	2727

32294 7590 05/16/2007
SQUIRE, SANDERS & DEMPSEY L.L.P.
14TH FLOOR
8000 TOWERS CRESCENT
TYSONS CORNER, VA 22182

EXAMINER
D AGOSTA, STEPHEN M

ART UNIT	PAPER NUMBER
2617	

MAIL DATE	DELIVERY MODE
05/16/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/713,430	WU ET AL.	
	Examiner	Art Unit	
	Stephen M. D'Agosta	2617	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on *27 April 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *2-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *17-20* is/are allowed.

6)☒ Claim(s) *2-4 and 9-12* is/are rejected.

7)☒ Claim(s) *5-8 and 13-16* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

Applicant's arguments, see amendment, filed 4-27-2007, with respect to the rejection(s) of the claim(s) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made.

1. The two USC 112 rejections are overcome by the amendment. Although it is the examiner's interpretation that for claim 2, the three groups of nodes are as described in the specification and drawings (eg. either 1 hop or 2 hops away).

2. The examiner has reconsidered his previous rejection and puts forth a new rejection (with new art).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 2, 9 and 10 ~~and 21~~ rejected under 35 U.S.C. 103(a) as being unpatentable over Haas et al. "Dual Busy Tone Multiple Access (DBTMA) - A Multiple Access Control Scheme for Ad Hoc Networks" and further in view of Tanabe et al. US 5,884,171 and Xu et al. "Does the IEEE 802.11 MAC Protocol Work Well in Multihop Wireless Ad Hoc Networks?".

As per **claims 2, 9 ~~and 21~~,** Haas teaches a method for enhancing fairness and performance in a multihop ad hoc network (Abstract), the method comprising:

providing information regarding a transmission between a first set of nodes of the network, wherein the information is provided to a second set of nodes in a range of two

hops from the first set of nodes participating at the transmission (figure 1 shows a "first set" where "A" and "B" are communicating and node "H" can be viewed as a "second set/node two hops away from node A". Haas also teaches that "synchronization information" can be sent to node "H", see page 2, left column:

"..In this paper, we propose the dual busy tone multiple access (DBTMA) protocol. In DBTMA, we use the RTS packets to initiate channel request. Two out-of-band busy tones are then used to protect the RTS packets and the data packets, respectively. One of the busy tones, the transmit busy tone, BTt, which is set up by the RTS transmitter, is used to protect the RTS packets. Another busy tone, the receive busy tone, BT, which is set up by the receiver, acknowledges the RTS packet and provides continuous protection for the incoming data packets. Nodes sensing any busy tone defer from sending their RTS packets on the channel. With the use of the RTS packet and the BT,. signal, the exposed terminals are able to initiate data packet transmissions. Furthermore, the ***hidden terminals*** *can reply to RTS requests and initiate data packet reception, while data packet transmission is taking place between the transmitter and the receiver..";* and

setting, after successfully finishing the transmission, a waiting time for the first set of nodes, in which the first set of nodes backoff from accessing a transmission medium (Haas teaches the CSMA/CA protocol which inherently sets backoff times for the "local" nodes, eg. as opposed to CSMA/CD which only detect collisions);

but is silent on providing "contention synchronization" information AND wherein, in the providing of the contention synchronization information provides the contention synchronization information is ~by generating a first black burst energy signal by each node in a third set of nodes of the network receiving a transmission request or a transmission clearance, the first black burst energy signal indicating a busy time of the transmission medium according to a mapping scheme.

The examiner must give each claim its broadest reasonable interpretation and since "contention synchronization" could literally be anything (eg. it is not empirically defined), the examiner puts forth Tanabe who teaches:

"...According to the above construction, both a transmitting terminal and a receiving terminal transmit a busy tone on a control channel while they are in process of data

communication. Another terminal which is ready to transmit data is supposed to check before data transmission that there is no busy tone transmitted, so that the terminal can start communication only when no terminal which is inside the checking terminal's communication range is in a communication process. As a result, HTP can be prevented.." (C4, L10-18).

Furthermore, Xu teaches:

"AN OVERVIEW OF THE IEEE 802.11 STANDARD [2]

*Like any 802.x protocol, the 802.11 protocol covers the MAC and physical layers. The standard currently defines a single MAC which interacts with three PHYs (all of them running at 1 and 2 Mb/s)..... The MAC layer defines two different access methods, the distributed coordination function (DCF) and point coordination function (PCF). We now describe the DCF in detail (since the PCF cannot be used in ad hoc networks, it is not described here). The basic access mechanism, the DCF, is basically a carrier sense multiple access with collision avoidance (CSMA/CA) mechanism. CSMA protocols are well known in the industry, the most popular being the Ethernet, which is a CSMA with collision detection (CSMA/CD) protocol. A CSMA protocol works as follows. A station desiring to transmit senses the medium. If the medium is busy (i.e., some other station is transmitting), the station defers its transmission to a later time. If the medium is sensed as free, the station is allowed to transmit. These kinds of protocols are very effective when the medium is not heavily loaded, since it allows stations to transmit with minimum delay.....In order to reduce the probability of two stations colliding due to not hearing each other, the well-known "hidden node problem," the standard defines a virtual CS mechanism: a station wanting to transmit a packet first transmits a **short control packet called request to send (RTS), which includes the source, destination, and duration of the intended packet and ACK transaction.** The destination station responds (if the medium is free) with a response control Packet called clear to send (CTS), which includes the same duration information. **All other stations receiving either the RTS and/or the CTS set their virtual CS indicator, called a network allocation vector (NAV), for the given duration and use this information together with the physical CS when sensing the medium.** The physical layer carrier sensing function is called clear channel assessment (CCA). The NAV state is combined with CCA to indicate the busy state of the medium. This mechanism reduces the*

probability of the receiver area collision caused by a station that is "hidden" from the transmitter during RTS transmission, ***because the station overhears the CTS and "reserves" the medium as busy*** *until the end of the transaction.* ***The duration information on the RTS also protects the transmitter area from collisions during the M-ACK (from stations that are out of range of the acknowledging station).*** *It should also be noted that, due to the fact that the RTS and CTS are short frames, the mechanism also reduces the overhead of collisions, since these short transmissions allow faster recognition of collisions than would be possible for the transmission of an entire packet. As we know, besides the hidden node problem, wireless packet networks also face the exposed node problem. A* ***hidden node is one that is within the interfering range of the intended destination but out of the sensing range of the sender.*** *Hidden nodes can cause collisions on data transmission. Exposed nodes are complementary to hidden nodes.* ***An exposed node is one that is within the sensing range of the sender but out of the interfering range of the destination.*** *If exposed nodes are not minimized, the available bandwidth is underutilized. However, in the 802.11 MAC layer protocol, there is almost no scheme to deal with this problem. This might cause a serious problem when it is used in multihop wire\-less networks. We will discuss this in more detail in the next sections". (Page 131, first two columns)*

It would have been obvious to one skilled in the art at the time of the invention to modify Haas, such that contention synchronization is used AND wherein, in the providing of the contention synchronization information provides the contention synchronization information is by generating a first black burst energy signal by each node in a third set of nodes of the network receiving a transmission request or a transmission clearance, the first black burst energy signal indicating a busy time of the transmission medium according to a mapping scheme, to provide means for alerting hidden terminals that they should not attempt to communicate with an in-range node that is currently communicating with another (out of range) node via the use of signaling messages (eg. black burst, RTS, CTS, etc).

As per **claim 3,** Haas teaches CSMA/CA and MAC Layer communications (see 1st page, 2nd column). These protocols use the DCF and PCF access methods inherently (eg. also see Xu, top of column 1: *The MAC layer defines two different access methods, the distributed coordination function (DCF) and point coordination function (PCF).)*

As per **claims 3 and 11-12,** Haas teaches CSMA/CA (1st page, 2nd column) and wireless network technology such as Bluetooth (1st page, 1st column). He also teaches 802.11 on page 977, column 1, para #3.

Allowable Subject Matter

1. Claims 17-20 allowed.

2. Claims 5-8 and 13-16 objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

These claims recite use of the "black burst energy signal" novel material

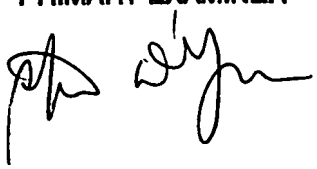
Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Stephen M. D'Agosta whose telephone number is 571-272-7862. The examiner can normally be reached on M-F, 8am to 5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bill Trost can be reached on 571-272-7872. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

STEVE M. D'AGOSTA
PRIMARY EXAMINER



5-10-07